

Research Communication

Accessory foramen transversarium and its incidence in atlas vertebrae

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Abstract: *The only ring shaped cervical vertebra present in human body is atlas, having articulations with occipital and axis vertebra. Presence of dorsal and ventral arches is responsible for its typical shape. On the sides where transverse processes are there, one foramen on each side named Foramen transversarium is present. 120 macerated dry atlas vertebrae were studied for the normal and accessory foramen transversarium. The present study is focused to investigate the presence of accessory foramen transversarium in dry atlas vertebra obtained from bone banks and to understand its significance, if any.*

Keywords: *cervical vertebra, atlas, Foramen transversarium, accessory foramen transversarium*

Introduction

The atlas is the first cervical vertebrae having a shape of a ring with neither a body nor a spine. It has got a short anterior and a long posterior arch, right and left lateral masses and transverse processes. The transverse process is unusually long which acts as an effective lever for rotatory movements of head. It is pierced by foramen transversarium which lodges the vertebral vessels and sympathetic plexus. [1] Since atlas is an important component of cranio- vertebral joint and has an immense clinical significance, its foramina's are considerable entities [2]. Foramen transversarium has been studied previously by various workers for its functional morphology [3, 4, 5]. Presence of an accessory foramen may be in relation to availability of an additional vertebral artery. The vertebral artery may have dual origin which moreover has side by side course with the main vessel. To understand various variations in presence of Foramen transversarium and its accessory counterparts are necessary for clinicians to know, for a safer and effective posterior approach.

Material and Method

120 dried macerated atlas vertebrae of both the sexes from various bone banks of region were obtained for the study of accessory foramen transversarium. Various observations regarding morphometric analysis were made in each case where it was present and recorded.

Observations

All the 120 atlas vertebrae which were studied showed presence of foramen transversarium as a characteristic feature of cervical vertebra. Out of total, 16 (13.33%) had accessory foramina on the posterior arch. When studied for further detail it was found that out of these 6 had it bilaterally (37.5%) whereas 4 on right side and 6 on left side only. Also 7 (i.e. 5.8%) showed presence of incomplete foramen transversarium of various degrees. Maximum accessory foramina were found to be extended side to side elliptical in shape (i.e. 63%) whereas oval (14.3%) and vertical elliptical (21.6%) shape too was there. The right sided foramina were with larger sizes as compared to left sided ones and in 26.3% cases they were even of the size of Foramen transversarium.

Discussion

The presence of an accessory foramen of the atlas showed immense morphometric variability. In the present study, shape of maximum observed atlas vertebrae was of category Type III according

to Taitz et al. classification [6]. Complete bilateral [7] or incomplete bilateral foramina [8] were reported while absolute absence of foramina transversarium which is a very rare variation was also found on left side, unilaterally [9]. It was also reported that an arcuate foramen on the posterior arch of atlas with complete fusion between the lateral masses and occipital condyles [7]. Studies revealed that Accessory FT is most common in 6th cervical vertebra (70%) and rarest at 3rd cervical vertebra (2.8%) [11]. In cases of narrow foramen the cause might be attributed to osteophytes that are responsible for it [12]. Even carrying heavy loads on head had marked implications regarding anomalies of atlas vertebra [2, 6]. The shapes of foramina have direct correlation with the tortuosity and dimensions of its major vessels. It was also reported that the tethering of vertebral artery as it passes through the extra canal on posterior arch which may lead to potential posterior circulation stroke [13].

Conclusion

This study is important for orthopedic surgeons, neurosurgeons, radiologists and physiotherapists to understand incidence, variation and importance of accessory foramen transversarium and its clinical importance to avoid misdiagnosis in their clinical practice.

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